

The Education and Training of Health Sciences Librarians



**National Library of Medicine
Long Range Plan**

The Education and Training of Health Sciences Librarians

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CHARGE TO THE PANEL FROM THE NLM BOARD OF REGENTS

The purpose of the NLM Planning Panel on the Education and Training of Health Sciences Librarians is to analyze the possible programs and activities of the NLM, of individuals, of professional associations, and of other institutions that might be undertaken over the next ten years in order to assure that:

- ▼ Society benefits from the skills of health sciences librarians; and
- ▼ Persons who choose health sciences librarianship will be properly educated and trained, and that they have opportunity to engage in the most important work concerning information and health care.

Rachael K. Anderson, M.S.
Chair, NLM Board of Regents
May 1993–May 1994

SUMMARY OF GOALS AND RECOMMENDATIONS

Evolving Roles for the Health Sciences Librarian

Goal 1.1: Prepare for the new forms of information, new users, and new practice patterns that may be required for health sciences librarianship.

- ▼ Health sciences librarians should foster partnerships with other information professionals in their institutions, and expand their roles in health services research and patient-related information.

Goal 1.2: Match the capabilities of health sciences librarians to the needs of employers.

- ▼ Professional organizations should take action, including establishing quantitative and qualitative measures of the value of information services for health care, so that employers know the worth of the services health sciences librarians provide.

Professional Educational Programs for Health Sciences Librarians

Goal 2.1: Update and enhance the curricula of Schools of Library and Information Science.

- ▼ Schools of library and information science should review their curricula and create outside work opportunities for their faculty in health sciences libraries.
- ▼ The MLA and other professional organizations should publicize excellent curricula of schools of library and information science.

Goal 2.2: Explore new approaches and degree programs for preparation of health sciences librarians to assume new roles.

- ▼ Universities and schools of library and information science should develop interdisciplinary educational programs, and promote leadership.

Lifelong Learning Programs for Health Sciences Librarians

Goal 3.1: Foster educational programs enabling health sciences librarians already in the workplace to update and extend their professional education and training.

- ▼ Health sciences librarians should take responsibility for their own professional development.
- ▼ Schools should sponsor continuing education programs.
- ▼ Professional organizations should strengthen their continuing education programs.

Goal 3.2: Experiment with alternative methods and courses of study for adult learning.

- ▼ Universities, schools of library and information science, and professional associations should focus on the special needs of adult learners. NLM should offer assistance.

Broadening Recruitment into Health Sciences Librarianship

Goal 4.1: Attract the best and brightest candidates the current market can provide.

- ▼ Professional organizations and health sciences librarians should be active in recruitment.
- ▼ Schools should mount aggressive recruitment campaigns.

Goal 4.2: Achieve greater cultural and ethnic diversity in the profession.

- ▼ Organizations should make a special commitment to minority recruitment.
- ▼ Schools should ensure a positive academic environment for minority students.

STATEMENT OF ACCEPTANCE OF THE PANEL REPORT BY THE NLM BOARD OF REGENTS

The NLM Board of Regents is privileged to play a role in the development of the National Library of Medicine. With the publication of the Board's Long Range Plan¹ in 1987, and subsequent updates on Outreach,² Electronic Imaging,³ and Toxicology and Environmental Health,⁴ the Board has articulated a challenging vision for the future of NLM, one that strives to be certain that the goals of health care and biomedical research will be furthered by technological advances in computer and information science.

This report lays out a number of opportunities for health sciences librarians, schools of library and information science, professional associations, and the National Library of Medicine to work together to assure that society benefits from the considerable skills and contributions of health sciences librarianship. On behalf of the Board of Regents of the National Library of Medicine, I am pleased to accept this report for incorporation into the Board of Regents' Long Range Plan for the Library.

*H. Kenneth Walker, M.D.
Chair, NLM Board of Regents
May 1994-*

STATEMENT BY THE PANEL CHAIR

The NLM Long Range Planning Panel on the Education and Training of Health Sciences Librarians met three times, in September and December 1993 and March 1994. Its membership is listed in Appendix 1: Panel Membership. The Panel considered NLM's role in broadening the educational and training opportunities for medical librarians in order to ensure that they will be prepared to play a critical role in our health care delivery system, which is undergoing dramatic changes.

Foremost among the changes are advances in technology that undoubtedly provide opportunities which did not exist even a decade ago. We now have access to digital networks that can transmit both text and visual images. We have at our command computing power that is able to deal with large amounts of data and provide linkages among sophisticated tertiary medical centers, regional hospitals, and clinics in rural areas.

In order to understand how health sciences librarians will function in the future, we have to make some predictions about how the health care delivery system will operate. It is my personal opinion that the following major changes are likely to occur:

- ▼ Hospitals, per se, will lose their preeminent role and will be replaced by regional health networks that will integrate outpatient, inpatient, rehabilitation, and home care and incorporate programs aimed at educating patients and their families about the nature of the illness they are dealing with.
- ▼ Even without health care reform legislation, the number of hospitals in the tertiary care system will be reduced and the ones that survive will be allied with a host of community hospitals located both in the city and in the surrounding suburban and rural areas, forming regional networks.
- ▼ The surviving tertiary health care systems with their regional alliances will assume responsibility for training physicians and other health professionals.
- ▼ There is at least a chance that some of the VA medical centers currently providing sophisticated tertiary care will be integrated with academic medical centers or teaching hospitals.
- ▼ Health care alliances formed around major academic medical centers will likely be entrusted with the responsibility of developing practice guidelines, setting up registries, and conducting broadly-based controlled clinical trials. As we become more realistic about what effective research can accomplish, priorities will probably change. Practice guidelines based on consensus conferences will likely be the first step, followed by development of registries, which, in turn, will identify diagnostic approaches or treatments which can be evaluated only by controlled clinical trials. Data from the clinical trials in turn will further modify practice guidelines.
- ▼ As managed care expands, primary care physicians and, perhaps later, nurse practitioners, will have a growing role in determining whether or not patients are eligible for specialty care or hospitalization. Given the accelerated growth of biomedical knowledge, however, the responsibilities given to primary care gatekeepers are likely to change. Specialists such as cardiologists, endocrinologists, and hematologists will become the logical choices to provide primary care to patients suffering from

such chronic illnesses as coronary artery disease, diabetes, or sickle cell anemia simply because they are the most capable of coping with new information. The third phase would be the replacement of primary care physicians by other primary care givers such as nurse practitioners, because the exploding knowledge base will make it impossible for physicians to operate competently as generalists.

- ▼ Outcome measures in the immediate future will no longer be restricted to morbidity or mortality but will include measures to determine to what extent a person, after receiving treatment, is capable of returning to the level of functioning which he or she was capable of prior to becoming ill.
- ▼ Lifestyle changes (such as low fat diets, smoking cessation, and exercise), together with other public health measures including improved housing and nutrition, will be supplemented by new tests and procedures derived from molecular biology and genetics that allow us to identify who is at risk for what kind of disorder early in life. Such testing will lead to novel experiments aimed at preventing, or at least substantially retarding, the onset of the disorder in question.

In order that students and practicing health sciences librarians acquire the knowledge and skills necessary to prepare them for leadership roles in the application of currently emerging information technologies to health care, graduate schools of library and information science, professional associations, health sciences librarians, and the National Library of Medicine must work together. I wish to thank the members of the panel who gave generously of their time and talent, Dr. Donald A.B. Lindberg, the Director of the National Library of Medicine, Dr. Elliot Siegel, Associate Director for Health Information Programs Development, Ms. Susan Buyer, Panel Executive Secretary, and the capable NLM staff who assisted us throughout our work.

*Thomas Detre, M.D.
Chair, NLM Planning Panel
on the Education and Training of
Health Sciences Librarians
September 15, 1994*

BACKGROUND

Profile of Health Sciences Librarians^{5,6,7}

- ▼ There are 7,000-10,000 professional health sciences librarians in more than 3,600 medical libraries and other health-related corporations and consortia in the U.S. and Canada.
- ▼ 37% work in cities with populations over 5,000.
- ▼ Fewer than 5% are employed in towns with under 10,000 persons.
- ▼ 46% work in hospital libraries.
- ▼ 25% work in academic health sciences centers.
- ▼ Over 80% are female.
- ▼ Less than 10% are from minority groups.
- ▼ 21% received their bachelor's degree in English or journalism, 19% in social sciences, 15% in biomedical or biological sciences, and 14% in education.
- ▼ 87% have a master's degree in library and information science or another field, and 4% hold a Ph.D.
- ▼ Approximately 60% of MLA members attend a continuing education (CE) course sponsored by an organization other than MLA, 38% attend an MLA Chapter-sponsored CE course, 19% attend an MLA Annual Meeting course, and 12% participate in MLA's Journal Club or self-study program.



Health sciences librarians play a vital role in making medical knowledge accessible to health professionals. The Panel believes that their role can and should be sharply enhanced as today's rapidly changing health care environment increases the demand for more effective management of information, be it in the form of patient education materials, clinical practice guidelines, decision support systems, or computer-based patient records.⁸

To achieve this goal will require fundamental changes in the ways that health sciences librarians are recruited, educated, and trained throughout their careers. There is a special need to increase the diversity of the profession to reflect the population as a whole. Many pressing public health problems such as the AIDS epidemic disproportionately affect minority communities.⁹ Outreach to these communities is an important part of health sciences librarianship today.

The 1987 NLM Long Range Plan¹⁰ promoted the development of a cadre of highly trained health sciences librarians to adapt new technologies to the needs of the biomedical community. It recommended that NLM help "institute new prototype programs containing special curricula in U.S. library and information science schools that emphasize integrated information concepts and the application of new technologies to information dissemination." Also envisioned was the need for continuing education opportunities to upgrade the skills of librarians currently in the workforce who must learn to use these technologies, and who are also increasingly called upon to impart these fundamental skills to health professional end-users in a variety of educational and clinical settings.

Recent advances in the technology of high performance computing and communications have dramatically accelerated the need for educational change.¹¹

Biomedical scientists and health practitioners are becoming increasingly dependent on computer-based tools for the conduct of research and the transfer of results to patient care. Information technology has at once become the means for advancing the pace of scientific discovery, in fields such as molecular biology,¹² and the means by which health care delivery in the academic medical center, the local community hospital, and the rural clinic can keep pace with rapid advances in the laboratory.^{13, 14}

Health sciences librarians are prepared to build upon their traditionally high level of skill in information management and service, and to support the biomedical community's continually expanding need for information systems integration in research, education and patient care.¹⁵

The challenge is to devise mechanisms that can provide the education and training needed. In 1991, the Medical Library Association (MLA) educational policy statement, *Platform for Change*,¹⁶ defined the professional attributes and technical capabilities required of the health sciences librarian of the future. Among its recommendations, the report specifically requests NLM to identify future directions and priorities for its activities in support of the educational needs of health sciences librarians. Convening the Planning Panel on the Education and Training of Health Sciences Librarians, therefore, was a direct response to both the NLM 1987 Long Range Plan and the MLA request.

In June 1993, NLM convened a Steering Committee¹⁷ to develop a framework for the panel. The Steering Committee assisted in defining the major issues that the full panel should discuss, likely future directions for health sciences librarianship that should be considered, desirable outcomes, membership and consultants for the panel, and additional background information that the panel would require.

Drawing on the Steering Committee's work, then Board of Regents Chair, Rachael Anderson, appointed the panel in the summer of 1993 and gave the following charge:

Analyze the possible programs and activities of the NLM, of individuals, of professional associations, and of other institutions that might be undertaken over the next ten years in order to assure that:

- ▼ Society benefits from the skills of health sciences librarians; and
- ▼ Persons who choose health sciences librarianship will be properly educated and trained, and that they have opportunity to engage in the most important work concerning information and health care.

The panel met three times during 1993-1994 to weigh these issues. In addition to the deliberations of the "core" panel

members, five "ad hoc" panels of experts were invited to speak on specific relevant topics: issues of employers of health sciences librarians, schools of library and information science, future changes in health care delivery, hospital libraries, and medical informatics.¹⁸

The "core" panel then formed working groups who produced informal reports in these and related areas.

The panel emphasized the need for creative thinking to develop strategies to address the challenges outlined in this report. One such strategy recommended herein is the NLM Challenge Award, detailed in chapter 5. The purpose of this award is to bring together interested organizations and institutions to develop implementations of specific high priority report recommendations.

Achievement of all of the goals of the following report is essential if health sciences librarians are to remain indispensable members of the health field and continue to provide high levels of service to the public health. To do so will require cooperation and collaboration amongst the various stakeholders—individual librarians, professional associations, health professionals, schools and universities, government agencies, and prospective employers.

Goal 1.1: Prepare for the new forms of information, new users, and new practice patterns that may be required for health sciences librarianship.

Findings

Major changes in health care are creating unprecedented opportunities and challenges for health sciences librarians.¹⁹

The Panel has found that new kinds of information are being required by new groups of users, often in non-traditional sites that do not have health sciences libraries.^{20, 21} Institutionally-based and community-based physicians and other health professionals, managers and administrators, patients, and health care consumers will all require new means of access to information resources as institutions realign themselves as part of health care networks serving enrolled populations.²²

Health sciences librarians have an important role in participating in the development of computer-based patient record systems and, in particular, their linkage to knowledge-based information to assure optimal decision-support for patient care. They will be called upon to do this collaboratively with other information professionals within their institutions, especially as health care institutions implement the new JCAHO standards on the Management of Information, which focuses on the spectrum of health-related information, including patient-based information, aggregate data, knowledge-based information, and comparative data.

Health services research addresses problems in organization, staffing, financing, utilization and evaluation of health care services. Clinical practice guidelines, in particular, are likely to assume an increasingly important role in federal and corporate efforts to promote quality care at affordable cost.^{23,24}

The panel is aware that NLM has been working to improve its products and services in the area of health services research information since 1990.²⁵ This effort has been expanded by special added appropriations from Congress²⁶ and through the creation of the National Information Center on Health Services Research and Health Care Technology. The Center's purpose is "the collection, storage, analysis, retrieval, and dissemination of information on health services research, clinical practice guidelines, and on health care technology, including the assessment of such technology."²⁷ This kind of information may become in the future equally important to health care organizations as the traditional biomedical research literature.

Recommendations

▼ *Health sciences librarians should capitalize on the Management of Information standards of the JCAHO as an opportunity to foster partnerships with other information professionals within their institutions, and to develop collaborative strategies dealing with common information problems.*

▼ *Health sciences librarians should become familiar with information resources related to health services research, and also assume additional responsibility for managing information related to patient and consumer education.*

Possible Implementation Steps

By health sciences librarians:

Use the latest in media and telecommunications technologies so that sites without medical libraries, such as the settings of most physician-extenders (for example, nurse practitioners and physician assistants), have access to medical data, and

Assist public libraries and other public agencies to have access to patient and consumer health information.

By NLM:

Provide specialized training for health sciences librarians and others at medical care institutions so they may have access to the growing body of health services research information.

Findings

Health sciences librarians have much to contribute to the changing health care system. A common view held by the Panel is that their capabilities are often not fully understood, utilized, or challenged.

Studies of the economic value of information services and systems may be valuable in assisting employers, administrators, policy-makers, and others to understand the possible contributions of health sciences librarians. Similarly, studies of what employers want from information professionals can help assure that the capabilities of health sciences librarians are responsive to "real world" requirements.

Recommendations

▼ *The Medical Library Association, the Association of Academic Health Sciences Library Directors, and other professional organizations should take action so that employers of health sciences librarians know the worth of the health information systems and services provided by the members of these organizations. Such actions should include studies to:*

Determine what employers want from information professionals; and

Establish quantitative and qualitative measures of the value of information services for health care.

Goal 1.2:
Match
the capabilities
of health
sciences
librarians
to the
needs of
employers.



Possible Implementation Steps

By professional associations:

Mount a campaign to inform employers about the considerable capabilities and evolving roles of health sciences librarians, and about the value to a health care organization of hiring better trained information professionals.

**Goal 2.1: Update
and enhance
the curricula of
Schools of Library
and Information
Science.**

Findings

The Panel believes that Graduate Schools of Library and Information Science are likely to continue to provide basic masters level education for many of the individuals employed by health sciences libraries. Courses in health sciences librarianship are currently offered by 47 of the 58 graduate programs in the U.S. and Canada.²⁸ Very few, however, have full-time faculty in health sciences librarianship.²⁹ While the number of library and information science programs has decreased in the past 10 years, the number of graduates has increased.

**Graduate Programs in
Library and Information Science³⁰**

	1983-4	1992-3
Graduate programs	63	58
M.L.S. graduates of these programs	3,694	4,955*

* from 54 schools that actually reported data to ALISE for 1992-3

Health sciences librarians and their employers are concerned that the curricula of library and information science

programs have not kept pace with changes in the field, especially in the area of information technologies. More library school students need to gain experience in work settings, so that they can begin to apply theory to practice.

The Medical Library Association in its *Platform for Change*³¹ lists seven broad areas of knowledge and skills that health sciences librarians must have:

- ▼ Health Sciences Environment and Information Policies
- ▼ Management of Information Services
- ▼ Health Sciences Information Services
- ▼ Health Sciences Resource Management
- ▼ Information Systems and Technology
- ▼ Instructional Support Systems
- ▼ Research, Analysis, and Interpretation

School of library and information science faculty need additional opportunities to retool and renew their skills through additional "real world" experience, including collaboration and research with others in related fields.³² Collaboration with informaticians and health sciences library practitioners will also provide opportunities for more contributions to the research base of the field.³³



Schematic of the interconnected "backbone" networks of NSF, NASA, and DOE, together with selected client regional and other networks. Data from September 1991. Courtesy of Donna Cox, Co-director of Scientific Communications and Media Systems, National Center for Supercomputing Applications, and Associate Director of Graphic Design, School of Art and Design, University of Illinois.

Recommendations

▼ *Schools of library and information science should ensure that their curricula allow students to acquire the knowledge and skills they need (including those identified in Platform for Change) to prepare them to be leaders in applying new information technologies to health care.*

▼ *Schools of library and information science should create opportunities for their faculty to work in health sciences libraries and to engage in joint research projects with health information professionals of all kinds.*

▼ *The MLA and other professional associations should publicize excellent curricula of schools of library and information science (by criteria derived from Platform for Change).*

Provide opportunities for students to receive credit for courses taken in other academic departments (for example, computer science, medical informatics, statistics);

Affiliate with health sciences libraries or institutions engaged in health informatics research to provide practical work experience for their students; and



Systematically seek the advice of practicing health sciences librarians concerning their educational needs and the effectiveness of their education and training in the practice of their profession.

By practicing health sciences librarians:

Offer preprofessional training opportunities in their libraries for students, so they can begin to apply theory to practice and participate in post-masters internship programs;

Seek doctorates in interdisciplinary programs outside the traditional domain of library science (for example, health care policy, business administration, medical economics, epidemiology, public health, and especially, medical informatics).

Possible Implementation Steps

By NLM:

Find several demonstration programs at schools of library and information science to upgrade their offerings in health sciences information.

By schools of library and information science:

Integrate technology, research, and medical informatics into all aspects of education for librarianship;

Goal 2.2: Explore new approaches and degree programs for preparing health sciences librarians to assume new roles.

Findings

The environment in which health sciences librarians will find themselves is complex, and it may not be enough for them to confine their preparation to library/information science courses. Coursework in other departments or schools (such as public health, social work, arts and sciences) is required by some library and information science programs. The panel has heard evidence of the curriculum of the University of Pittsburgh School of Library and Information Science, which requires interdisciplinary courses in a number of university departments.³⁴

This is especially true at the doctoral level. Library science professionals are seeking their doctorates in interdisciplinary programs outside the traditional domain of schools of library and information science in areas such as medical informatics, health care policy, public health, medical economics, business administration, and epidemiology. In these contexts, librarians with doctoral level research and communications experience will not only make a mark, they will lead.³⁵

During a brainstorming session, the Panel developed a comprehensive “wish list” for the curriculum of the future³⁶ which, if all courses were included, could extend the traditional length of graduate training far beyond the current 1-2 years. However, it provides a good description of the kinds of knowledges and skills that the panel believes are important for health sciences librarianship, and provides a “menu” from which courses could be selected.

Recommendations

▼ *Universities and Schools of Library and Information Science should create new programs to prepare prospective health sciences librarians for leadership roles in the application of information technology to health care.*

Possible Implementation Steps

By schools of library and information science:

Offer three levels of training: a basic MLS degree that incorporates a core of health sciences and informatics training; a joint MLS-MS in informatics program that includes “hands on” exposure to the substantive problems central to health care informatics, including systems development experience; and a MLS degree with a doctorate in informatics requiring substantive research experience and traditional thesis defense.³⁷

Explore alternatives to traditional MLS courses, such as the various approaches to “distance learning” now being tried at a number of universities.

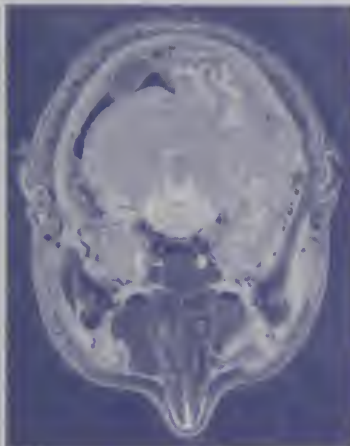
By universities and schools of public health:

Develop expanded masters in public health (M.P.H.) degree programs that would include coursework in library/information science. Such programs would provide additional training for librarians with M.L.S. degrees and multidisciplinary training for those in related fields.



NATIONAL LIBRARY OF MEDICINE

Color Photographs from the Visible Human Project



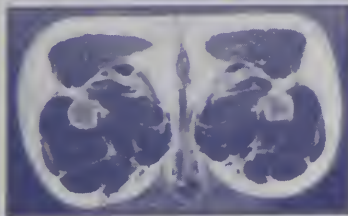
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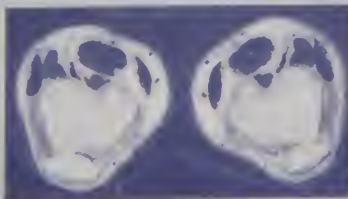
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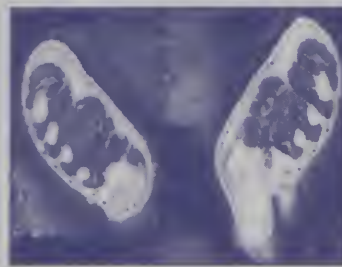
Abdomen



Pelvis



Thigh



Feet

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Goal 3.1: Foster educational programs enabling health sciences librarians already in the workplace to update and extend their professional education and training.

Findings

The pipeline into health sciences librarianship is already full, with the bulk of the librarians already employed in health care institutions and likely to be there for the next fifteen years. These librarians need educational programs to prepare them for the challenges of the coming years.³⁸ The field of health care is information intensive and changing rapidly. Librarians must continue to acquire new skills by which to keep pace themselves and to assure the dissemination of that information to users.

The Medical Library Association has an active continuing education program, with courses given at annual and chapter meetings,³⁹ a journal club,⁴⁰ and self-study programs.⁴¹ Other associations with continuing education activities include the Special Libraries Association (SLA), the American Society for Information Science (ASIS), and the American Medical Informatics Association (AMIA). Additionally, the Council on Library Resources (CLR) provides support for library research, as well as mid-career internships and senior fellowships.⁴²

Traditionally, Schools of Library and Information Science have done very little in the area of continuing education with some notable exceptions, mainly because there is no rewards system for faculty participating in these programs as far as tenure and promotion is concerned.⁴³

Some of the methods that have been tried for continuing education are not as effective as hoped. For example, courses given at annual association meetings do not reach members who can not afford to travel to the meeting, or non-members; internships that require working adults to relocate for a year do not take into account family and other responsibilities that prevent people from taking advantage of these programs.

For example, NLM and the Council on Library Resources sponsored a program in the 1980s to provide training opportunities for leadership roles for mid-career librarians.⁴⁴ It was the experience of this program that there was not a sufficiently large pool of candidates to draw upon, at least in part because working adults were not able to leave home and family responsibilities to participate in it.

Recommendations

▼ *Health sciences librarians should continue to take individual responsibility for their own professional development. At the same time, supervisors must support and guide employees in upgrading their skills.*

▼ *Schools of library and information science, and other institutions of higher learning, should sponsor programs that contribute to the concept of life-long learning and to the retooling and continuing development of practicing health sciences librarians.*

▼ *The MLA and other professional associations should strengthen their continuing education and professional publications programs.*

Possible Implementation Steps

By schools of library and information science:

Offer mentorships, post-masters internships, and weekend or summer programs for health sciences librarians; and

Offer educational opportunities, perhaps in cooperation with professional associations or the National Network of Libraries of Medicine (NN/LM), for those

entering health sciences librarianship from other domains.

By professional organizations:

Develop self-study programs that take into account the needs of adult learning, including options for week-end study, distance learning, and home study.

Design courses for transmission across the Internet or over other telecommunication technologies supporting distance learning.

By NLM:

Fund proposals to train health sciences librarians and others through the NN/LM to use the new communications and infor-

mation technologies, including those related to High Performance Computing and Communications;

Establish mentorships for the advanced training of mid-career health sciences librarians at major libraries with established clinical, research, service, and training programs relevant to medical informatics;

Develop a summer informatics institute for practicing librarians at one of the NLM-funded medical informatics training programs; and

Develop collaborative programs for training librarians in the various information resources supporting health outcomes research and related health reform issues.

Findings

Programs enabling working professionals to obtain graduate instruction by weekend and summer study have been tried successfully at the University of Alabama at Birmingham, where the weekend and distance learning program for a Masters of Public Health draws students who travel many miles to get there, and are considered some of the best students in the School of Public Health.^{45, 46}

A similar program exists at the University of Pittsburgh and, the panel thinks, possibly other universities too. So far as the Panel knows, these M.P.H. programs have not been tailored or adapted towards the needs of health sciences librarianship.

▼ *NLM should offer assistance to institutions that wish to accept responsibility for creating and evaluating new educational offerings designed for adult learners in the field of health sciences librarianship.*

Goal 3.2:
Experiment with alternative methods and courses of study for adult learning.

Recommendations

▼ *Universities, schools of library and information science, and professional associations should develop innovative new degree and non-degree programs for continuing education of health sciences librarians.*

Possible Implementation Steps

By universities and schools of public health:

Develop expanded Masters in Public Health (M.P.H.) degree programs geared to the adult learner. These might include features such as weekend class schedules, self-directed lessons, learning at a distance, and use of the Internet for interactive learning and assessment. Such programs would provide additional training for librarians with M.L.S. degrees and multidisciplinary training for those in related fields.

Goal 4.1:
Attract the
best and brightest
candidates the
current market
can provide.

Findings

There is a need to encourage entry into the profession by a diverse group of talented individuals who incorporate not only traditional library science backgrounds, but various additional professional competencies such as public health, computer programming, and informatics to complement library skills while simultaneously providing the diverse talents required in the modern health sciences library.

Historically, candidates have been discouraged from pursuing the library profession due to stereotypes and lack of information. Candidates remain unaware of the potential the field has to offer and are often ignorant of this exciting career opportunity. Most recruits do not associate the kinds of activities librarians actually carry out with the field itself⁴⁷ and this fact, combined with the lower salary range that is common to librarianship⁴⁸ (as opposed to other well-known professions such as medicine or law) serves to discourage many potential candidates.

However, the climate of librarianship and information technology have altered dramatically. Librarians need to educate society about the high level of skill and expertise that characterize today's health sciences librarian; otherwise the field may be denied needed high level professionals.

The Panel believes that these recruitment efforts should be recognized as important by the profession as a whole. Professionals in the field, both current practitioners and library school faculty, must ask themselves if recruitment efforts have matched the professed goals of the profession, and, in response, must adjust their current level of personal and professional activities to achieve this goal.

Recommendations

▼ *The Medical Library Association and other professional organizations should undertake an aggressive recruitment program to encourage entry into the profession by a diverse group of talented individuals.*

▼ *Health sciences librarians should promote the field to potential candidates and be prepared to encourage future practitioners and leaders in the field.*

▼ *Schools of library and information science should mount aggressive campaigns to recruit future library professionals with leadership potential.*

Possible Implementation Steps

By professional associations and schools of library and information science:

Encourage highly suitable candidates to pursue librarianship in the health sciences by promoting the profession as an



attractive and significant career. Make marketing and image building campaigns a high priority.

Direct recruitment efforts at undergraduates. Introduce students with potential to the challenges of the profession through substantive library work.

Directly involve library school faculty in identifying and recruiting highly qualified candidates. Reward faculty for these

activities as part of their required academic track activities.

Attract highly motivated candidates at an early age through recruiting and career planning activities at both the primary and secondary school levels.

Emphasize one-on-one contact with potential recruits by health sciences librarians or library school faculty.



Goal 4.2: Achieve greater cultural and ethnic diversity in the profession.

Findings

Less than 10% of the currently active professional health sciences librarians are minorities.⁴⁹

Only 8.5% of the 1991-92 M.L.S. graduates in this country were members of minority groups, according to statistics compiled by the Association for Library and Information Science Education (ALISE).⁵⁰

During the ten year period from 1981-82 to 1991-92, the overall percentage of ethnic minorities receiving master's degrees from programs accredited by the American Library Association (ALA) edged up by only 1.2%.⁵¹

Of the 58 schools reporting to ALISE, nine accounted for more than half of all African American graduates.⁵²

There is a need to recruit candidates who possess the full range of characteristics necessary to reflect both the cultural diversity of the nation and the wide range of expertise required to function successfully in today's highly technical library environment.⁵³

The Panel believes that in order to address these changes and respond to the specific health information needs of the minority community, recruitment efforts must be intensified and expanded across a wide range of organizations not traditionally attuned to health sciences librarianship.

Recommendations

▼ *The MLA, NLM, African American Medical Library Association, and other organizations should together make a special effort to increase the recruitment of qualified minorities into the profession. These efforts need to begin early and be intensive enough so that the potential librarians attain adequate quantitative skills and background to compete effectively.*

▼ *Schools of library and information science should provide a positive academic environment for minority students. Faculty must be sensitive to minority issues to enhance the attractiveness of library school programs and provide an environment conducive to the success of minority students.*

Possible Implementation Steps

By NLM and MLA:

Establish a national committee of minority health sciences librarians to explore new strategies for attracting minorities into the profession.

By schools of library and information science:

Direct recruitment efforts to regions that have high percentages of minorities:

Help with career planning at Historically Black Colleges and Universities (HBCUs) so as to increase the pool from which the library schools draw their students;⁵⁴ and

Provide scholarships and fellowships to minority students.

By professional associations:

Work with minority-oriented professional library associations such as the African-American Medical Library Association, the Black Caucus of the American Library Association, the Asian/Pacific Islander Library Association, and the American Indian Library Association to begin a nationwide recruitment drive utilizing recruitment literature aimed at minority student populations.⁵⁵

Actively participate in college and university campus career fairs as a regular recruitment activity. Channel such activities through other non-library minority organizations such as the United Negro College Fund, the Urban League, the National Association for the Advancement of Colored People, and comparable organizations serving other minority groups in order to reach the targeted audiences.⁵⁶



NLM should establish "Challenge Awards" to support planning for implementation of specific report recommendations deemed to be of exceptionally high that requiring further study.

The essential objective of these awards is to identify specific groups and institutions that are prepared to take responsibility for a portion of the problem, to form alliances and to work collaboratively toward achievement of our common goals.



High priority areas include but are not necessarily limited to the following examples:

- ▼ Evolving role of the health sciences librarian. For example, the role of health sciences librarians in the management of institutional information systems, perhaps coupling knowledge based systems with computer based patient record systems. Possible participant groups include JCAHO, MLA, the National Association for Health Data Organizations (NAHDO), and the Association for Health Services Research (AHSR).
- ▼ Professional educational programs for health sciences librarians. Curriculum development, and experimentation with alternative curricular models within the MLS course of study. Areas of experimentation could include core and elective coursework, practical educational technologies, accelerated instruction schedules, etc. Possibilities for joint faculty appointments and combined degree programs at the masters and doctoral levels should also be thoroughly explored. Possible participant groups include universities and associations.
- ▼ Lifelong learning programs for health sciences librarians. Education of professionals after they have joined the job market is essential for retaining skills and learning required new ones. The

current rapid growth of electronic information systems both aggravates the need and appears to offer a means to assist in the solution to learning problems. The panel heard descriptions of university-based MPH programs at two schools that were conducted over weekends, and used home study and electronic methods, and that might be extensible to include medical informatics and medical librarianship. We believe it will be worthwhile for NLM to offer support to a group or a consortium of interested groups who wish to conduct a careful study of this problem and to propose new strategies. Possible participant groups include universities and professional associations.

- ▼ Broadening recruitment into health sciences librarianship. How to attract people to the field who can meet its growing challenges remains an important issue. With the increasing cultural diversity in our society, accompanied with varying information needs and requirements for services, it is particularly important that minorities be better represented in the profession. Special efforts are needed to increase recruitment and retention of minority students, as well as to ensure that the best and brightest of any ethnicity are being brought into careers in health

sciences librarianship. Possible participant groups include MLA, African-American Medical Library Association, the United Negro College Fund and comparable organizations serving other minority groups, Association of Academic Health Science Library Directors (AAHSLD), and ALA.



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Funding for Challenge Awards

Funding would be made available by the NLM for one to two year planning grants and possibly for subsequent pilot studies and projects. Applications would be solicited by a public announcement.

Awards would be made following evaluation and competitive selection. Awards should be made to a single primary sponsor institution for a proposal that includes an explicit commitment of other associations, institutions, and individuals to seek solution of a challenge; co-sponsorship by other funding sources would be desirable.

APPENDIX 1: PANEL MEMBERSHIP

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(December 8, 1993)

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Ad Hoc Panel on Hospital Libraries

(December 8, 1993)

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Phoenix, AZ

**Ad Hoc Panel on
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(December 8, 1993)

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Lois Ann Colaianne, M.L.S.

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Milton Corn, M.D.

Associate Director for
Extramural Programs



APPENDIX 2: COURSES IN HEALTH SCIENCES LIBRARIANSHIP OFFERED BY ALA-ACCREDITED LIBRARY SCHOOL PROGRAMS 57

Northeast

Catholic University of America
School of Library & Information Science

- ▼ Information Sources & Services:
Science & Technology
- ▼ Health Sciences Literature
- ▼ Health Sciences Librarianship
- ▼ Practicum

Drexel University
College of Information Studies

- ▼ Medical Librarianship
- ▼ Medical Bibliography
- ▼ Resources in Science & Technology

Long Island University, Palmer School
of Library & Information Science

- ▼ Practicum in Health Sciences
Librarianship
- ▼ Science & Technology:
Sources & Services
- ▼ Health Sciences: Sources & Services
- ▼ Health Sciences Librarianship
- ▼ Searching the Health-Related
Databases

State University of New York at Albany
School of Information Science and Policy

- ▼ Special Libraries in Information Centers
- ▼ Information in the Sciences Internship

University of Maryland
College of Library & Information Services

- ▼ Health Information Reference Services
- ▼ Abstracting & Indexing Sources in
the Health Sciences

State University of New York at Buffalo
School of Information and Library Studies

- ▼ Information Sources in the Sciences
- ▼ Practicum in Health Sciences
- ▼ Health Science Librarianship

University of Pittsburgh
School of Library and Information Science

- ▼ Field Experience
- ▼ Library Services to Special Populations
(patients, aging)
- ▼ Science & Technology Information
Sources & Services

- ▼ Update in Health Information
- ▼ Special Library &
Information Center Management
- ▼ Health Sciences Information
Sources & Services
- ▼ Introduction to Medical Informatics
- ▼ Seminar (topic varies)

Pratt Institute
School of Information and Library Science

- ▼ Reference Materials and Services
in the Health Sciences
- ▼ Databases Retrieval in
the Health Sciences
- ▼ Medical Librarianship
- ▼ Seminar and Practicum

Queens College, City University of New York
*Graduate School of Library and
Information Studies*

- ▼ Information Sources and Services:
Science And Technology
- ▼ Internship
- ▼ Organization & Management:
Special Libraries & Information Centers
- ▼ Health Sciences Librarianship

University of Rhode Island
*Graduate School of Library and
Information Studies*

- ▼ Health Sciences Librarianship
- ▼ Professional Field Experience

Rutgers University
*School of Communication, Information
and Library Studies*

- ▼ Management of Health Sciences
Libraries
- ▼ Medical & Health Sciences
Bibliography

St. John's University
Division of Library and Information Science

- ▼ Materials and Services to Special Users
- ▼ Special Libraries & Information Centers
- ▼ Research Methods
- ▼ Information Sources in Science and
Technology
- ▼ Health Science Literature and
Librarianship
- ▼ Internship

Simmons College
Graduate School of Library and
Information Science

- ▼ Medical Librarianship

Southern Connecticut State University
School of Library Science & Instructional
Technology

- ▼ Special Libraries & Documentation Centers
- ▼ Library Science Practice
- ▼ Science-Technology-Literature & Sources
- ▼ Medical Bibliography & Libraries

Syracuse University
School of Information Studies

- ▼ Biomedical Information Services
- ▼ Internship

Southeast

University of Alabama
School of Library and Information Studies

- ▼ Information Resources Sciences
- ▼ Special Libraries & Information Centers
- ▼ Medical Librarianship
- ▼ Internship in Medical Library

University of Kentucky
College of Library and Information Science

- ▼ Professional Field Experience
- ▼ Information in Science & Technology
- ▼ Health Sciences Libraries
- ▼ Independent Study in Library & Information Science

Louisiana State University
School of Library and Information Science

- ▼ Information Resources for the Health Sciences
- ▼ Health Sciences Information Centers
- ▼ Field Experiences in Health Sciences Information Centers
- ▼ Directed Independent Study in Biomedical Databases
- ▼ Directed Independent Study in Special Topics for Health Sciences Information Centers

University of North Carolina
School of Information and Library Sciences

- ▼ Science Information
- ▼ Health Sciences Information
- ▼ Supervised Field Experience
- ▼ Research and Information Science
- ▼ Master's Paper

North Carolina Central University
School of Library and Information Sciences

- ▼ Science & Technology Resources & Services
- ▼ Health Sciences Resources & Services Practicum

University of South Carolina
College of Library and Information Science

- ▼ Health Sciences Libraries
- ▼ Health Sciences Library Services
- ▼ Health Sciences Literature
- ▼ Internship in Librarianship

University of South Florida
Division of Library and Information Science

- ▼ Health Sciences Librarianship
- ▼ Supervised Fieldwork

University of Tennessee, Knoxville,
Graduate School of Library & Information
Science

- ▼ Sources & Services in Science & Technology
- ▼ Special Libraries & Information Agencies

Midwest

University of Illinois, Graduate School of
Library and Information Science

- ▼ Practicum
- ▼ Reference Services in the Sciences
- ▼ Medical Literature and Reference Work

Indiana University
School of Library and Information Science

- ▼ Literature of Science & Technology
- ▼ Introduction to Health Sciences Librarianship
- ▼ Directed Research on Specific Issues
- ▼ Practicum in Specific Settings
- ▼ Advanced Readings in Specific Issues

University of Iowa
School of Library and Information Science

- ▼ Medical Librarianship and Bibliography
- ▼ Practicum in Libraries

Kent State University
School of Library and Information Science

- ▼ Science/Technology Information Sources and Services
- ▼ Practicum

University of Michigan
School of Information & Library Studies

- ▼ Sources of Information in the Sciences
- ▼ Sources of Information for the Medical & Health Sciences
- ▼ Directed Field Experience
- ▼ Information Management in Special Libraries & Information Centers

University of Missouri, Columbia,
School of Library and Information Science

- ▼ Literature of Science and Technology
- ▼ Practicum in Health Sciences Libraries
- ▼ Medical Subject Analysis
- ▼ Health Science Librarianship and Bibliography
- ▼ Research
- ▼ The Biomedical Community
- ▼ Computer Applications in Health Care

Rosary College
Graduate School of Library and Information Science

- ▼ Reference Sources in the Sciences
- ▼ Health Sciences Librarianship
- ▼ Health Sciences Librarianship Practicum
- ▼ Topics in Advanced Medical Librarianship Reference
- ▼ Topics in Medical Librarianship Administration
- ▼ Independent Study

Wayne State University
Library Science Program

- ▼ Medical Bibliography and Medical Library Administration
- ▼ Traineeship in Medical Librarianship

- ▼ Library Systems & Services: Medical Classification & Subject Analysis
- ▼ Library Systems & Services: Medical Information Search Strategy

University of Wisconsin-Madison
School of Library and Information Science

- ▼ Field Project in Library and Information Agencies
- ▼ The Special Library
- ▼ Bibliographic Structure for Science & Technology
- ▼ Special Collections
- ▼ Topics in Information Agency Management

University of Wisconsin-Milwaukee
School of Library and Information Science

- ▼ Information Sources and Services in Science and Technology
- ▼ Information Sources and Services in Health Sciences
- ▼ Information Retrieval in the Health Sciences
- ▼ Fieldwork in Library and Information Services

Southwest

University of North Texas
School of Library & Information Science

- ▼ Health Sciences Internship
- ▼ Health Sciences Information Management
- ▼ Medical Informatics
- ▼ Biomedical Databases
- ▼ Special Topics in Health Sciences Information
- ▼ Seminar in Advanced Topics in Medical Informatics
- ▼ Special Topics in Medical Informatics

University of Oklahoma
School of Library and Information Studies

- ▼ Biomedical Bibliography and Reference Materials
- ▼ Biomedical Databases
- ▼ Internship Library/Information Centers

*University of Texas at Austin
Graduate School of Library and
Information Science*

- ▼ Information Resources in the Health Sciences
- ▼ Seminar: Cognitive Studies
- ▼ Biomedical Informatics
- ▼ Medical Libraries

*Texas Woman's University
School of Library and Information Studies*

- ▼ Health Sciences Librarianship: Information Sources
- ▼ Health Sciences Librarianship: Organization and Management
- ▼ Health Sciences Librarianship: Internship
- ▼ Independent Study
- ▼ Special Topics

West

*University of California at Berkeley
School of Library and Information Studies*

- ▼ Bibliography and Information Service
- ▼ Practicum in Information Services
- ▼ Health Sciences
- ▼ Field Study in Library and Information Studies

*University of California at Los Angeles
Graduate School of Library &
Information Science*

- ▼ Bibliography of the Health & Life Sciences
- ▼ Health & Life Sciences Libraries
- ▼ Internship

*University of Hawaii
School of Library & Information Studies*

- ▼ Information Sources & Systems in Science & Technology
- ▼ On-line Electronic Reference Services
- ▼ Internship

*San Jose State University
School of Library and Information Science*

- ▼ Resources in the Life Sciences
- ▼ Practicum

*University of Washington
Graduate School of Library and
Information Science*

- ▼ Information Access in Science & Technology
- ▼ Information Access in Health Sciences
- ▼ Directed Field Work

Canada

*University of Alberta
School of Library & Information Studies*

- ▼ Library Materials & Information Services
- ▼ Scientific Information Resources
- ▼ Information Resources in Specialized Fields

*University of British Columbia
School of Library, Archival and
Information Studies*

- ▼ Information Resources in Health Science
- ▼ Reference and Information Services I
- ▼ Reference and Information Services II
- ▼ Services for Groups with Specialized Interest
- ▼ Advanced On-line Searching
- ▼ Individual Research Project
- ▼ Practicum
- ▼ Field Experience
- ▼ Thesis

*Dalhousie University
School of Library and Information Studies*

- ▼ Health Sciences Literature and Information Sources

*University de Montreal
Ecole de Bibliothéconomie et des Sciences
de L'information*

- ▼ Information Resources in Sciences & Health Sciences

*University of Toronto
Faculty of Library and Information Science*

- ▼ Health Sciences Information Resources

Introduction

As society moves firmly into the information age, there is an increasing need for people who have a clear understanding of the many facets of the information process and the technical skills to support that process. While information handling was once almost entirely the province of librarians, that is no longer the case. Exponential growth in biomedical knowledge and new information technologies are redefining the infrastructure of health care, education, and research, spawning an array of professional specialties and reworking what was a well-defined arena of information service.

Though there is little doubt that changes in the health information environment presage significant change in the roles of health information professionals and in the knowledge and skills expected of them, librarians may be blindsided unless they understand the new environment's strategic impact on the profession. Already, according to the Council on Library Resources, "at the heart of many of the present problems facing librarians and library education is the failure to describe the profession and its present role in terms that are compelling, expansive, and accurate. The principles, the responsibilities, and the body of knowledge that shape the profession are real and of great importance...but they are either implicit or incompletely formed and are certainly not widely understood...."¹

Over the past fifteen years, the Medical Library Association (MLA) has cited the need for a coalition of expertise and resources within the profession to define the competencies needed for professional practice and to support their acquisition in graduate school and beyond. Still, the

profession has yet to act decisively enough in preparing its members for a world that continues to change radically in response to the rapid growth of biomedical knowledge and technical power.

The current document seeks both to respond to the need for a clear and forward-looking statement of expectations for medical librarians and to provide an agenda for future action. Rather than a patchwork of novel notions and suggestions for improvement in graduate and continuing education, what follows builds on the noteworthy achievements of MLA and recent research to construct a platform for change in the health information professions.²

At one level, *Platform for Change* breaks new ground in its approach to and structure for education and professional development for health sciences librarianship, describing a collaborative, integrated, individual-centered response whereby information professionals in health-related environments may keep pace with change. On another and more specific level, the document provides concrete guidelines for graduate programs in health sciences librarianship, constructs a framework for all education programs and opportunities coordinated by MLA, and sets direction for those who are best positioned to address professional development needs as they occur throughout the career of a health information professional.

Written for immediate use by leaders and members of MLA, by providers of educational programs in health sciences librarianship and information management, and by health care professionals, *Platform for Change* looks beyond the short term and anticipates areas of emerging importance beyond the year 2000. As Estelle Brodman said over a decade ago,

"We must educate for the problems of a generation hence, not for the problems of today...librarians must be imbued with the psychological ability to handle change and to live with ambiguity. Without this they will be performing tomorrow's tasks with yesterday's concepts."³

Platform for Change provides a foundation on which to develop a new consensus within the health information community on the knowledge and skills required to meet the needs—present and future—of health care, research, and education in technologically intensive, user-driven, and rapidly changing organizations.

Medical Librarianship in Context

The health sciences environment of the late twentieth century is inundated by information sources, products, and services. Libraries and the clients they serve are buffeted by rapid change on multiple fronts. Medical knowledge continues to grow exponentially. High technology and a growing reliance on the computer and other forms of telecommunications affect every aspect of life and work. Electronic access to information is commonplace, and the widespread availability of personal computers at once increases the demand for instant access, lessens reliance on librarian intermediaries, and affords the opportunity for innovative information service roles.

Libraries and librarians are in a unique position to become part of an information management solution, an integrated scheme for expanding and making optimal use of an institution's total information resources. To be sure, all branches of librarianship—and indeed many other professions—share a conviction that information professionals promote access to society's individual and collective wisdom. Health sciences librarianship stands apart,

however, in striving to ensure that advances in science and the technology of health care are readily accessible to health care practitioners, educators, students, researchers and consumers.

While drawing heavily on general librarianship, a librarian in the intellectually and technologically sophisticated context of health care also requires expertise and values significantly different from those of colleagues in some other library services. Although the library remains the principal organizational conduit for biomedical and related information, the librarian's role in the institution is no longer restricted to the library.

The health sciences librarian is pivotal in the handling of biomedical information, combining the ability to use the knowledge bases of medicine and the technical expertise of librarianship with clearheaded problem solving, analytical competence, and well-honed interpersonal and organizational skills. Librarians assume responsibility, transcending that of the library itself, for assessing the information needs of a diverse array of medical and health services professionals; managing health information resources; coordinating their location, selection, acquisition, analysis, and use; facilitating the integration of print, nonprint, and computing resources into the institution's information system; and helping clientele master the basic skills of information handling.

The health sciences librarian not only provides specific support to the institution by using new technologies to organize, synthesize, and filter information for scholarly, clinical, and institutional decision making, but also plays a critical role in the investigation and study of information storage, organization, use, and application in education, patient care, and the generation of new knowledge. In

accomplishing these responsibilities, the medical librarian must forge alliances throughout the institution, eliciting strong support for the library's mission and outreach and collaborating with fellow professionals to meet identified information needs.

Today, the management of information and knowledge in a health care environment is a national priority. In fulfilling professional roles that support health care, librarians must reconsider and reshape the educational process that prepares new information professionals and continually enhances the skills and knowledge of current practitioners.

Continuum of Learning

Biomedical librarians will function over the next decade in ways shaped by a number of significant factors: changing elements and structure of medical knowledge; rapid introduction of new technologies and techniques for information processing and dissemination; altered patterns of institutional organization, management, and governance; and the drive to maintain excellence. Education for medical librarianship is uniquely challenged both because the gap it attempts to bridge is inherently unstable and defies efforts to span its expanse and because it cannot be limited to any phase of a professional's life. Furthermore, responsibility for its effective application in practice belongs to the individual professional rather than to any institutional provider of educational programs and services.

Continuing education and continuing learning are conditions of professional practice. Education comes into focus as the more formal, episodic, and visible expression of the drive for learning that

pervades professional life. In graduate and continuing education, professionals are directed by others toward explicit sets of closely related learning goals.

Continuing learning, however, is not so reliant on the structured interventions that convey, refresh, and update baseline knowledge or bring in new knowledge, skills, and techniques. In continuing learning, professionals assume greater responsibility for directing themselves, usually informally, and often pursue several unrelated learning strategies simultaneously, to increase competence and improve professional performance. Such learning often takes place through an active network of individuals mentoring one another in the context of their work and often through the very activity of that work.

Structured education, then, is but one of the tactical options open to the professional. A larger frame of reference—a continuum of learning—is needed in order to influence professional performance for the twenty-first century.

In the continuum of learning, the single most important variable is the individual professional: his or her motivation, prior experience, sense of what is required by changing circumstances or conditions of employment, and quality of judgment in choosing learning experiences. The continuum moves from the didactic toward the self-directed, from a narrow band of specialized knowledge and skill toward a broader environment of cognitive and social complexity. Learning moves along a continuum from stable and consistent conditions toward those that confront learners with changing and less-structured but learner-important problems, close to actual work situations.

The continuum of learning has significance for all who hold a stake in the professional performance of health sciences librarians. As providers of educational programs and services use the continuum as a model for professional learning, new streams of programs may emerge, combining more complex, self-directed strategies with ongoing update and refresher activities. Answers to questions of quality, accessibility, and significance are tailored to individuals and groups with shared needs, goals, and arenas of practice. Roles of graduate schools, professional societies, commercial vendors of programs, and others are clarified. For employers, discovering, advancing, and tending learning relationships within and outside the organization is a key task. For professionals, learning plotted on the continuum can become intentional, undertaken with personal-professional, and institutional outcomes in view and mixing self-managed learning experiences with provider- or employer-directed programs.

Collaboration in developing a common learning and development agenda is a reasonable next step for universities, graduate colleges of library and information studies, MLA and other professional societies, commercial vendors and publishers, employers, and consumer-professionals. All who take a comprehensive approach to education and learning in health sciences librarianship must endorse fundamental career planning, knowledge and skills development, and collaboration. Competence assessment, professional mentoring, and the recognition of excellence in performance can serve the profession best through a combined effort.

Health Information Science Knowledge and Skills

Health sciences librarianship is multifaceted. The profession acknowledges the need for knowledge and skills that intersect equally important areas: the knowledge bases of the health sciences, the application of general information principles to the health sciences setting, specific health information systems, and management and personal skills.

Health information professionals will possess varying levels of knowledge and skills in seven broad areas.⁴ No one individual can achieve mastery of all knowledge and every skill, but every organization will require collective expertise in all areas. Individuals will emphasize different areas at different points in their career, with specific needs varying over time from assignment to assignment and by institutional setting. The knowledge and skills are not listed in priority order and may be applicable to more than one area.

Health Sciences Environment and Information Policies

Health sciences librarians must understand the contexts in which the need for biomedical and related information emerges and the unique ways of perceiving and interpreting those environments. Therefore, they should be alert to the changing information and health care environments and the major program and policy sources, including

- ▼ legal, ethical, economic, and legislative issues;
- ▼ health sciences professions: system and structure, terminology, education and training patterns, and associations and organizations; and

- ▼ purpose, programs, and activities of MLA, the National Library of Medicine (NLM), and related information associations and organizations.

Management of Information Services

Leadership in the application of library and information science to the handling of health sciences information resources in complex institutional environments requires specialized knowledge, skill, and understanding of management, including

- ▼ the institution's mission and the specific mission of the information resource center;
- ▼ institutional and functional planning processes;
- ▼ decision-making strategies;
- ▼ human resources management and labor relations;
- ▼ staff development;
- ▼ project and program management and evaluation;
- ▼ organizational structure and behavior;
- ▼ interinstitutional relations;
- ▼ numerical literacy and computational proficiency;
- ▼ finance and budgeting, cost analysis, and price setting;
- ▼ fund-raising and proposal writing;
- ▼ public relations and marketing;
- ▼ facilities planning and space allocation;
- ▼ oral and written communication; and
- ▼ interpersonal relations.

Health Sciences Information Services

Health sciences librarians require knowledge of the content of information resources and skills in using them. They must understand the principles and practices related to providing information to meet specific user needs and to ensure convenient access to information in all forms, including

- ▼ information needs of health practitioners, researchers, educators, students, and consumers;
- ▼ information-seeking and transfer characteristics of user groups and individuals;
- ▼ assessment of identified information needs;
- ▼ health sciences and other information resources and their relevance to specific information needs;
- ▼ retrieval strategies and techniques;
- ▼ analysis, evaluation, and synthesis of information for identified needs;
- ▼ methods of information delivery and access;
- ▼ development of services tailored to meet needs of individual and group users; and
- ▼ resource sharing.

Health Sciences Resource Management

Health sciences librarians must know the theory of, as well as have skills in, identifying, collecting, evaluating, and organizing resources and developing and providing databases, including

- ▼ identification and selection of materials and their sources;
- ▼ acquisition of materials;
- ▼ bibliometric techniques;
- ▼ thesauri construction;
- ▼ bibliographic tools;
- ▼ cataloging and classification theory;
- ▼ national and international standards and conventions, including cataloging and filing rules;
- ▼ indexing, abstracting, and classification systems;
- ▼ inventory control techniques;
- ▼ serial publications;
- ▼ resource conservation and preservation;
- ▼ publishing industry;

- ▼ trends in information formatting, production, packaging, and dissemination; and
- ▼ copyright issues.

Information Systems and Technology

Developments in technology have reshaped the goals and systems of health sciences librarianship and changed the way information professionals function. Health sciences librarians must be able to understand and use technology and systems to manage all forms of information, including

- ▼ basic principles of automated systems:
 - record and file construction,
 - computer hardware and software,
 - telecommunications and networking,
 - database management software,
 - systems analysis, and
 - artificial intelligence and expert systems;
- ▼ human behavior and technology;
- ▼ design, use, and evaluation of information systems;
- ▼ acquisition, use, and evaluation of information technologies; and
- ▼ integration of systems and technologies into the long-term information management needs and plans of the institution.

Instructional Support Systems

Teaching ways to access, organize, and use information to solve problems is an essential and ever-widening responsibility of the health sciences librarian. Effective instruction entails not only knowledge of the structure and content of specific courses and technology but also an understanding of and expertise in

- ▼ learning theory and cognitive psychology.

- ▼ curriculum and instructional development,
- ▼ instructional systems design,
- ▼ educational needs assessment and analysis,
- ▼ learning style appraisal,
- ▼ instructional methodologies, and
- ▼ evaluation of learning outcomes.

Research, Analysis, and Interpretation

Few dispute the library's responsibility to explore the "fundamental nature of biomedical information storage, organization, utilization, and application in learning, patient care, and the generation of new knowledge." In order to conduct and interpret research, the health sciences librarian is called upon to apply knowledge, skills, and understanding of

- ▼ theoretical bases of health sciences information, education, and clinical practice;
- ▼ information structure, transfer, and processing;
- ▼ analysis, evaluation, and application of research results;
- ▼ methods for evaluation of system effectiveness and efficiency;
- ▼ statistical theory; and
- ▼ research methodologies.

In the future, the profession is likely to need an array of knowledge and skills, not all of which are envisioned in this list. Developments in the field will require librarians to continue to acquire new knowledge and skills. At the same time, the profession will continue to define its mission and scope, reshaping the body of knowledge and skills—adding new ones and increasing and decreasing the importance of others.

Recommendations

Lifelong learning must be a cornerstone of every individual's professional development plan. Graduate programs of library and information science education, MLA and its chapters and sections, NLM, employers, commercial vendors and publishers, and other professional associations are all potential providers of educational opportunities, yet the ultimate responsibility for lifelong learning and professional development rests with the individual.

Today's health information professionals have varied educational backgrounds and experiential knowledge. Librarians currently employed in health sciences libraries are likely to remain active until well into the next century. They will require ready access to continuing education and training opportunities in order to incorporate into their practice new technological developments, knowledge bases, and information management techniques. In light of the rate of environmental change, the specific knowledge and skills required of health sciences librarians, and the broad scope of the continuum of learning, it is clear that all who have a stake in the success of the profession need to take action. Therefore, this document sets forth some general recommendations, then outlines specific recommendations for those who play key roles in the professional development of health information professionals.

General Recommendations

1. Individuals must assume personal responsibility for aggressively seeking lifelong education and professional development opportunities from a variety of sources.

The teaching-learning process is two-sided. Quality educational systems and programs are available from a variety of sources.

Providers have responsibility for maintaining quality instruction. The individual, however, must actively pursue those sources that best provide the necessary learning. This mutual pursuit of quality education must continue throughout the length of a professional's career.

2. A coalition of interdisciplinary educational providers and consumers should be established to explore new opportunities in the continuum of learning.

Given the pace of change and the continuing arrival of new players in the information arena, it is imperative that this document not be viewed as definitive. The coalition would eliminate a stagnant approach to collaboration and would seek new ways to strengthen the continuum of learning. Fomenting broad discussion of controversial issues could challenge satisfaction with the status quo and stimulate creative responses to changing needs. The coalition would be charged with developing innovative, high-impact models for curriculum content, design, methodology, and assessment.

3. All instructional systems must provide the impetus and forum for continued education of the educators. The success of professional learning depends on well-informed, forward-looking providers of education and training. Educators must be supported in continuing their personal professional development, acquiring new pedagogical skills, refreshing their awareness of developments in librarianship and related disciplines, and demonstrating command of the competencies needed by practicing librarians. Each of the organizations, singly and in concert, provides direction to the educators who alter the contour of professional performance.

4. Strategies must be developed to recruit bright, articulate, creative, and energetic individuals as health information professionals, including those who pursue formal training as librarians and those who pursue degrees in related disciplines. All partners in the educational process must actively forward strategies that ensure recruitment of promising individuals who demonstrate the basic skills and aptitude for achieving excellence in the field. Such candidates will evince analytic abilities, interpersonal skills, self-understanding, willingness to take risks, persuasiveness, keen intellect, and an unquenchable desire to learn. Because of new technologies, increased specialization in health care, and the emergence of new roles for the health sciences library, the character of library staffing will change. Those with degrees in education, computer technology, medical informatics, and the like offer topical expertise that may be a necessary adjunct to traditional library and information science. Recruiting those with complementary training into an M.L.S. program or integrating them into library operations should be given full consideration in an expansive, interdisciplinary recruitment initiative.
5. Centers of excellence in health information should be identified, designated, and funded at strategic points across the country to provide opportunity for the acquisition of new knowledge and skills.

Health sciences libraries are dramatically shaping a new electronic environment for knowledge acquisition, information management, and information transfer. Some are at the forefront of change and

are well-suited to be training locations for health information professionals. Programs should be fostered that couple hands-on experience with practical problems and exposure to new paradigms for information access and knowledge transfer with opportunities to use the skills in a trainee's home institution.

Individual Health Information Professional

6. Every health sciences librarian must design and implement a plan for continuing professional development. Individuals bear the major responsibility for the enhancement of their own professional knowledge and skills. This document can be used as an outline to assess one's current level of mastery and to plan for further development. The Academy of Health Information Professionals is another way to help individuals chart, structure, and receive recognition for professional growth. Quality of performance can be increased by applying these professional skills to forward the mission and services of one's own institution, which ultimately also forwards one's own personal and professional growth.
7. All health information professionals must actively promote and contribute to the development of health sciences librarianship. If health sciences librarianship is not merely to survive but to be a force for improved health scholarship and research, all librarians must advocate for and contribute to the programs that produce new graduates, the learning opportunities that enhance skills, the environment that permits or blocks the fulfillment of new roles and services, and mentoring of other information professionals.

Medical Library Association

8. To assist employers in recruiting and retaining individuals who will be successful in the changing arena of health sciences librarianship, MLA must set the standards for professional competency and compensation. MLA must work with employers who are seeking to recruit individuals who are equipped to meet challenges in the changing technological arena of health information management. MLA can provide guidance to employers by developing standards for professional competence. Employers must also be made aware of the level of compensation required to recruit and retain such highly skilled staff.
9. MLA must take a leadership role in creating a vital and responsive professional development program and a dynamic set of coordinated education opportunities. Members have traditionally looked to MLA for continuing education opportunities. To meet the expanding needs of its members, MLA must broaden its offerings; forge new coalitions and relationships; and examine new delivery systems, teaching/learning strategies, and curricular options. MLA's professional development program must also include a program that assists members in the assessing their own professional growth. To ensure that the professional development program is meeting the current and future needs of the profession, an ongoing program evaluation component should be designed.
10. MLA must exercise leadership and work collaboratively with all participants in the educational arena. The MLA Board of Directors, the executive director, MLA staff, various working committees and task forces, and MLA members must continually monitor and influence the range of educational programs. At times, MLA will wish to act independently to meet its members' needs. At other times, MLA will either collaborate with others or rely completely on the services or educational offerings of an outside agency. Such providers cover a broad spectrum, including universities or colleges, vendors, commercial trainers, individual entrepreneurs, and other professional associations.
11. MLA should foster staff development programs offered by employers. MLA can assist employers by creating a model staff development policy that outlines the appropriate scope and content of an institution-specific policy. The model should be adaptable for use in augmenting the skills of all levels of personnel in the library.
12. MLA must establish a formal liaison with the schools of library and information science education. MLA should be an active member of the Association for Library and Information Science Education. Likewise, MLA must maintain ongoing communication and collaboration with the deans or directors of library and information science programs, particularly those programs that offer specialized course work in health sciences librarianship.
13. MLA must design and implement a research agenda that advances the professional knowledge base. In line with its strategic plan, MLA will need to lead the way in advancing the basic and applied knowledge of information management. Research will be necessary to measure the state of

health sciences library practice, compare data to previous studies, and draw new action plans. A research agenda should outline all areas of importance to MLA and delineate those areas that will be appropriate for exploration by MLA and its subsets, NLM, individual researchers, or related information disciplines.

Employers

- 14.** Employers should place a high priority on staff development. A strong staff development program ensures that the institution will fulfill its mission and that staff will meet the demands of a changing environment. To be effective, a staff development program should balance institutional needs and the professional growth objectives of the individual. The employer should assist individuals in assessing their own professional development and in designing a program of learning experiences. The institution should have a well-articulated staff development policy that recognizes a broad array of formal and informal sources within and outside the institution, outlines institutional and individual responsibility, and commits resources to support the program.
- 15.** Employers should provide institution-based training within the context of the broader educational experience. The employer should accept the responsibility for providing high-quality on-the-job training in appropriate areas that complements education from other sources. The opportunity to acquire knowledge and skills and to teach other staff should be built into job descriptions. Trainers themselves must receive training and support. The employer must ensure that knowledge transfer and application takes place in the job setting.

Governance and management strategies that support and contribute to learning within the organization should be devised.

- 16.** Employers should recruit individuals of competence and promise, including those with unique educational and professional backgrounds, to meet the information needs of the institution. Employers should articulate and practice high standards in recruiting individuals for their organizations. Recruitment practices should encourage diversity in the workplace. In addition, employers should develop strategies for influencing the profession as a whole to recruit persons with outstanding ability, motivation, and knowledge. These include providing feedback to other educational providers on qualities contributing to success on the job and rewarding persons for exceptional performance.

Library and Information Science Education

- 17.** Every graduate program in library and information science must lay a broad foundation that stresses theory over application, places librarianship in context with other related disciplines, fosters professional values, and prepares students to design their own learning program throughout the length of their careers. Every curriculum must provide a perspective on library and information science that is sufficiently broad to prepare students for a variety of possible job settings, both for now and in the future. Properly designed and executed, all library and information science education programs (not just those that offer a health sciences library specialization) lay the foundation on which a practicing librarian can build competent performance in a health science environment.

18. Educators should provide a range of programs and opportunities that meet needs throughout one's professional career, rather than focus solely on the master's degree. All practitioners experience a lifelong impetus for retooling of skills. All information professionals are expected to seek continuing education, and some will wish to acquire advanced certificates or doctoral degrees. Library and information science education programs have generally concentrated on new students and have not always recognized or responded to ongoing educational needs. Library educators, like their medical school counterparts who oversee continuing medical education programs, can coordinate a portfolio of courses, seminars, and institutes using a variety of instructors and educational techniques to support this end.

19. Educators need to define the boundaries of their programs and develop effective relationships with other related information disciplines. Increasingly, libraries will employ both librarians and other information professionals with different educational training and formal degrees. The ALA-accredited degree will be one of a number of possible acceptable degrees for health information professionals. Potential students and employers must have a way to compare and discriminate among programs.

National Library of Medicine

20. NLM should identify future directions and priorities for its activities in support of the educational needs of health sciences librarians. As the only medical library in the country with a national mission, NLM has special responsibilities that transcend individ-

ual institutions and constituencies. It provides leadership for those engaged in direct service to health professionals and in research about the process of health information management and delivery. Its preeminence in health information services and its long-standing and mutually beneficial relationship with MLA argue for its direct involvement in meeting the educational needs of health information professionals.

21. NLM should convene a planning panel on education for health sciences librarianship. NLM has long been involved in planning for and developing new information services and systems of access to biomedical information. Its vision for the future describes a new information infrastructure in an electronic environment⁶ and foresees biomedical libraries throughout the country with "a substantial cadre of well-trained library professionals who are able to provide the information resources needed by health sciences professionals."⁷ If this vision is to become real, the need for professional leadership in medical librarianship is obvious. As in the past, NLM now has an opportunity to make immeasurable contributions to excellence in health information science by assuming a proactive and collaborative stance in planning and implementing programs of education and training for entry-level and career professionals.

November 20, 1991

Project Description

In May 1989, the MLA Task Force on Knowledge and Skills was appointed in response to a number of different initiatives. First was MLA's own strategic plan and the strategy that aims to influence curricula of academic institutions in the areas of design, development, and management of information systems. To achieve this, it was necessary to validate what it is that health information professionals do and then to determine what will be needed in the future. A second impetus, closely related to the first, was the current revision underway of the American Library Association (ALA) standards for accreditation of master's programs in library and information science. As a part of that revision process, each of the major library and information science associations was asked to provide the ALA Committee on Accreditation with educational and other policy statements pertinent to the needs of that organization so that they could be shared with the education programs. The task force (see appendix 2 for list of members) determined that the best way to produce the desired results would be to survey a sample of the membership with two goals in mind: to define the knowledge and skills required for competent professional performance now and in the future, and to enable MLA to establish educational policies that would ensure the acquisition and maintenance of those activities throughout a professional career. When tabulated and analyzed, these data provided an inventory of knowledge and skills described in two major ways: scope—what are these skills, and setting—where is the learning most likely to be applied and most likely to occur. Though there is little doubt that changes in the health information environment will call for signif-

icant changes in the knowledge and skills expected of health information professionals in the future, there had been little research on which to base judgments about what general areas of expertise are likely to be required. Nor had research been conducted to assess the present level of specific knowledge and skill among health sciences librarians. In January 1990, an application was submitted to the Council on Library Resources for assistance in funding the survey and other related activities. The task force received a grant of slightly more than \$9,300 from the council. Additional support was received from MLA and from the University of South Carolina.

Methodology

The task force identified an inventory of knowledge and skills with sixty-three topics grouped into seven knowledge bases:

- ▼ health sciences environment and information policies;
- ▼ health sciences information services;
- ▼ health sciences resource management;
- ▼ information systems and technology;
- ▼ management of information services;
- ▼ instructional support systems; and
- ▼ research, analysis, and interpretation.

A questionnaire was distributed to a structured sample of 704 individual members of MLA in July 1990, with follow-up conducted in August. Usable responses were received from 375 of the 704 personal members to whom questionnaires were sent (53%). The basic objective of the study was to gather data that would provide answers to the following questions:

- ▼ To what extent do health sciences librarians consider identified areas of knowledge and skill important to effective professional performance now and in the environment of the future?

- ▼ To what extent do health sciences librarians perceive that they now possess these skills?
- ▼ Where do health sciences librarians tend to acquire knowledge in these areas?
- ▼ Where do health sciences librarians consider such knowledge is best acquired?

In addition to these questions, the study was designed to explore possible relationships between the answers to the foregoing questions and the health sciences librarian's institutional setting, level of responsibility, and years of experience in the field. These responses and the conclusions drawn from them were subsequently discussed with outside experts, including library educators, hospital administrators, medical educators, health sciences library directors, medical informatics researchers, and academic library directors.



Platform for Change: Appendix 2

Medical Library Association Task Force on Knowledge and Skills

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Notes

1. Information studies: a new CLR professional education program. Annual report of Council on Library Resources. Washington, DC: Council on Library Resources, 1989:26.
2. See appendix 1 for a description of a project to describe knowledge and skills, funded by MLA, the Council on Library Resources, and the University of South Carolina.
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4. Developed as a reference for professionals throughout their career, the knowledge and skills have been grouped into seven categories. The categories reflect and elaborate on the core areas of essential knowledge of the Academy of Health Information Professionals, which were defined as the essential areas of knowledge that new professionals must master.
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7. *Ibid.*, p. 27.

APPENDIX 4: INGREDIENTS FOR THE CURRICULUM OF THE FUTURE ⁵⁹

Computer Technology

- ▼ Telecommunications/Networking
- ▼ Artificial Intelligence and Expert Systems
- ▼ Computer Hardware/Software (Database Management Systems, Spreadsheets; Searching)
- ▼ Access to Virtual Data in an Integrated Environment
- ▼ Medical Informatics
- ▼ Linguistics

Provision of Information Services

- ▼ Information Sources and Retrieval in Health Sciences (Print and Computer-Based; Search and Retrieval Skills of Multiple Systems)
- ▼ Database Design and Construction- Thesaurus
- ▼ Document Architecture and Delivery
- ▼ Information Structure, Transfer and Processing
- ▼ Information Systems Design and Use
- ▼ Teaching End Users Educational Technology/Problem-Based Learning
- ▼ Communication Skills
- ▼ Information Seeking Behavior

Organization/Management

- ▼ The Business of Medical Libraries- Planning, Budgeting, Etc.
- ▼ Management and Human Resource Skills
- ▼ Project Management
- ▼ Marketing and Public Relations
- ▼ Managing Change/Change Agent
- ▼ Supervisory Skills
- ▼ Oral and Written Communications
- ▼ Intangible Personal Attributes

Research Skills

- ▼ Research Capabilities
- ▼ Research Methods
- ▼ Quantitative Methods for Decision-Making and Analysis

Medical/Health Care Environment

- ▼ Ethics and Legal Aspects
- ▼ Health Care Policy and Practice
- ▼ Understanding of Biomedical Research
- ▼ Role of Information in Society and Health
- ▼ Organization of Health Care
- ▼ History of Science and Medicine
- ▼ General Survey of Medicine and Medical Science
- ▼ Administrative, Economic, Social Functions of Institutional Settings

Requirements

- ▼ Ph.D. Terminal Degree
- ▼ Coursework in Research Methods
- ▼ Thesis Requirement
- ▼ Required Concentrations in Other Disciplines:
 - Health Sciences
 - Technology
 - Management Science
- ▼ Practicum

APPENDIX 5: A SAMPLE LIBRARY AND INFORMATION SCIENCE CURRICULUM ⁶⁰

Medical Librarianship/Health Information Management

[University of Pittsburgh School of Library and Information Science, 1992]

If you are interested in a career in medical librarianship or in health information management, your program must include the four required core courses and a choice of 24 additional credits from among the following. Six credits should be taken from appropriate health-related course offerings outside of the School of Library and Information Science Department of Library Science; a field placement (LIBSCI 2021) is strongly recommended.

School of Library and Information Science, Department of Library Science

- ▼ Research Methods and Statistics
- ▼ Government Information Resources and Services
- ▼ Science and Technology Resources and Services
- ▼ Business and Economics Resources and Services
- ▼ Indexing and Abstracting
- ▼ Information Storage and Retrieval
- ▼ Applications of Microcomputer Software
- ▼ Technologies for Information Management
- ▼ Library Cooperation and Networking
- ▼ Special Library and Information Center Management
- ▼ Law Resources and Services
- ▼ Health Sciences Resources and Services
- ▼ Ethics in the Information Society

Students wishing to specialize in health sciences/biomedical librarianship should also take at least six credits from among the following courses; additional non-School of Library and Information Science/DLS credits may be taken by petition.

School of Library and Information Science, Department of Information Science

- ▼ Introduction to Information Science
- ▼ Human Information Processing
- ▼ Information Seeking Behavior
- ▼ Information Needs Assessment

Graduate School of Public Health

- ▼ Introduction to Health Service Administration
- ▼ Health Information Systems
- ▼ Medical Care Organization
- ▼ The Federal Health Establishment
- ▼ Structure & Management of Health Services Organizations
- ▼ Health Program Evaluation
- ▼ Health Organizations & Health Professions
- ▼ Principles of Statistical Reasoning
- ▼ Introduction to Statistical Methods I
- ▼ Introduction to Statistical Methods II

School of Social Work

- ▼ Grant Proposal Writing
- ▼ Health Systems Policy
- ▼ Research Methods

Faculty of Arts and Sciences

- ▼ Medical Sociology
- ▼ Medical Ethics
- ▼ Introduction to Medical Informatics
- ▼ Medical Expert Systems
- ▼ Scientific Explanation
- ▼ Health Psychology

School of the Health-Related Professions

- ▼ History of Medicine and Health Care
- ▼ Introduction to Health Care Information Systems

School of Education

- ▼ Lifestyle and Health

School of Nursing

- ▼ Research Methodology

APPENDIX 6: MEDICAL LIBRARY ASSOCIATION CONTINUING EDUCATION COURSES, 1994-5 ⁶¹

Health Sciences Environment and Information Policies

- ▼ The Environment of Health Care
and Biomedical Information

Management of Information Services

- ▼ Basic Library Management
- ▼ Principles of Hospital Library
Management
- ▼ Introduction to Financial Management
for Health Science Libraries
- ▼ Planning Library Facilities
- ▼ Managing Reference Services;
Bringing Policy to Action
- ▼ Getting Funded: Developing Skills
in Proposal Writing

Health Sciences Information Services

- ▼ Information Needs of Health
Professionals
- ▼ Introduction to Reference Sources
in the Health Sciences
- ▼ Government Information Resources
- ▼ Information Resources in
Clinical Medicine
- ▼ Consumer Health Information Services
- ▼ Nursing Information Access:
Library Service for the Nursing
Profession
- ▼ Geriatric and Gerontology
Information Resources
- ▼ Information Resources in Dentistry
- ▼ Essentials in Database Searching
- ▼ Oncology: Concepts and Resources
- ▼ MeSH® for Searchers

Health Sciences Resource Management

- ▼ Development and Assessment of
Health Sciences Library Collections
- ▼ Descriptive Cataloging:
Applications, Problems, Solutions
- ▼ MeSH and NLM Classification

Information Systems and Technology

- ▼ *Courses under development*

Instructional Support Systems

- ▼ Planning and Administering a
Bibliographic Instruction Program

Research, Analysis, and Interpretation

- ▼ Research Methods for the Health
Sciences Librarian
- ▼ Research Proposal Development
for Librarians
- ▼ Writing for Publication



FOOTNOTES

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17. See Appendix 1, p. 33.
18. See Appendix 1, p. 31-3.
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included, extend the traditional length of graduate training far beyond the current 1-2 years. However, it provides a good description of the kinds of knowledge and skills that the panel believes are important for health sciences librarianship.

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